

Remarks

Claims 1-11 are pending in this application. Claims 1, 3, 4, 7 and 8 have been amended. Support for the amendment to claim 1 may be found throughout the specification, for example, on page 9, lines 20-23 and page 19, lines 13-16. Claims 3, 4, 7 and 8 have been amended to recite “as compared to a non-transgenic control plant”; support for this language may be found throughout the specification, for example, on page 5, lines 28-33.

No new matter is introduced by the foregoing amendments. Applicants expressly reserve the right to pursue subject matter removed from the current claims by amendment in a later application. Consideration and allowance of the pending claims are requested.

Rejections under 35 U.S.C. §112, second paragraph:

Claims 1-11 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully traverse this rejection.

The Office action states that in Claim 1, “complementary” should be amended to “fully complementary” so that the claim does not read on a 2-mer sequence or a different sequence. Claim 1 has been amended in which the recitation “complementary” has been removed. Therefore, this rejection should be withdrawn.

The Office action states that in Claims 3, 4, 7 and 8 the recitation “non-modified” is confusing and should be replaced with “non-transgenic control.” Applicants believe that this language is clear, but in the interests of furthering prosecution have amended Claims 3, 4, 7 and 8 to replace the term “non-modified” with the term “non-transgenic control.” Applicants believe that the amendments obviate the rejection. Therefore, this rejection should be withdrawn.

Rejections under 35 U.S.C. §112, first paragraph:

A) Enablement

Claims 1-6 stand rejected under 35 U.S.C. §112, first paragraph, as allegedly not being enabled. Applicants respectfully traverse this rejection for at least the following reasons.

The present Office action states that the “breadth of claims encompass complementary sequence and sense strand having drought tolerance phenotype” and “undue experimentation is required by a skilled artisan to determine how complementary strand can encode a polypeptide with drought tolerance property.” To advance prosecution in the current case, claims 1, 3 and 7 have been amended to remove the reference to a complementary sequence element. At least this portion of the present rejection should be withdrawn.

The Office action, at page 2, further states that the specification “while being enabling for isolated nucleic acid encoding a polypeptide DRO2 polypeptide SEQ ID NO: 2, does not reasonably provide enablement for sequences which have less than 100% sequence identity to SEQ ID NO: 2.” The Office action states that Guo *et al.* (*PNAS*, 101: 9205-9210, 2004) teach “that there is a probability factor of 34% that a random amino acid replacement in a given protein will lead to its functional inactivation” and thus, “it is highly unpredictable that a nucleic acid sequence which is not 100% identical to SEQ ID NO: 2 would encode a polypeptide that has the ability to modify a response to stress.” The Office action also states that “neither the state of prior art nor the specification provide guidance on which region(s) of SEQ ID NO: 2 is able to tolerate deletions, additions or substitutions of one or more amino acids without abrogating drought tolerance function.” Applicants respectfully disagree.

First, the question is not what effect a random mutation might have on the function of a protein sequence, as Guo *et al.* discuss. Instead, it is whether the instant specification allows one of ordinary skill in the art to make and use a plant comprising a nucleotide sequence that (1) encodes a polypeptide sequence that has at least 95% sequence identity with SEQ ID NO: 2, and that (2) conveys increased drought tolerance on the plant. Applicants provide sufficient

teachings in the specification, particularly in view of the level of skill of those in the art, to enable the scope of the invention as currently claimed.

As stated in the specification on page 8, functional domains can be identified using the PFAM program (Bateman *et al. Nucleic Acids Res.* 27: 260-262, 1999). This information alone allows one of ordinary skill in the art to identify functional domains of SEQ ID NO: 2 and thus, identify regions that are more or less likely to tolerate deletions, additions or substitutions of one or more amino acids without affecting drought tolerance function. Applicants also provide detailed description of particularly desirable domains. For example, description of the conserved Dof DNA-binding domain is provided, including the consensus sequence for a zinc finger domain. See, for example, page 19, lines 13-16. This domain has been identified as being important in plant development and growth. Further, as stated in the specification on page 8, “a preferred DRO2 fragment comprises a DNA binding domain, most preferably a Dof-type zinc finger domain (PF02701).” Claim 1 has been amended to specify that the encoded DRO2 polypeptide includes a Dof-type zinc finger domain.

In addition, Applicants reassert arguments made in the Response filed May 3, 2006: The Federal Circuit has repeatedly stated that enablement is not precluded by the necessity for some experimentation, so long as the experimentation is not undue. *In re Wands* 8 USPQ2d 1400 (Fed. Cir. 1988). A considerable amount of experimentation is permissible, if it is merely routine, or if the specification provides a reasonable amount of guidance in which the experimentation should proceed. *Id.* The present application provides the guidance necessary to make and use the sequences encompassed in the claims. The specification describes how to determine which sequences have at least 95% sequence identity to SEQ ID NO: 2. See, for example, page 10, lines 3-15. Methods are provided for determining which residues are highly conserved (for example, page 12, lines 4-6) and how to make polypeptide variants (for example, page 13, lines 3-9). Methods are also provided for the generation of transgenic plants, and for determining if a plant (particularly a transgenic plant) is drought tolerant. See, for example, Example 1 on pages 17-18. Therefore, undue experimentation is not required to make and use a plant transformed with a nucleotide sequence that encodes a polypeptide sequence that has at

least 95% sequence identity with SEQ ID NO: 2, and that conveys increased drought tolerance on the plant.

Applicants point out that the requirement of at least 95% sequence identity to SEQ ID NO: 2 provides very predictable and defined structure for the sequences encompassed by the claims. This claimed percentage identity and the size (253 amino acids) of SEQ ID NO: 2 permits only up to 13 amino acid changes within the protein. Various studies performed by (*e.g.*, Mushegain *et al.*, *Genome Res.* 8: 590-598, 1998 and Koonin *et al.*, *Mol. Microbiol.* 25: 619-637, 1997) illustrate that function is often maintained even amongst orthologous sequences having relatively low levels of sequence identity. Copies of Mushegain *et al.*; and Koonin *et al.* are provided herewith as **Exhibits A** and **B**, respectively.

Claims 1-6 are as amended herewith are fully enabled by the specification. Applicants request that the rejection under 35 U.S.C. §112, first paragraph, be withdrawn.

B) Written Description

Claims 1-6 stand rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement for the reasons of record stated in the Office action mailed January 30, 2006. Applicants respectfully traverse this rejection for at least the following reasons. As a preliminary matter, Applicants note that the claims currently pending do not refer to orthologs; it is understood that this portion of the January 30 rejection is no longer applicable.

The rejection alleges that “there are insufficient relevant identifying characteristics to allow one skilled in the art to predictably determine such mutants and allelic variants of other plants, or the structure of DRO2 proteins from other plants and organisms, absent further guidance.” As established in *Ex parte Parks*, “adequate description under the first paragraph of 35 U.S.C. 112 does not require literal support for the claimed invention. . . . Rather, it is sufficient if the originally-filed disclosure would have conveyed to one having ordinary skill in the art that an appellant had possession of the concept of what is claimed” *Ex parte Parks*, 30 USPQ2d 1234, 1236-37 (B.P.A.I. 1993) (emphasis added).

In the current instance, the original disclosure clearly conveys that Applicants had possession of the claimed invention, and certainly of the concept of what is currently claimed. Applicants had possession of the polypeptide sequence in SEQ ID NO: 2; Applicants had also contemplated and provided explicit written description of polypeptides with at least 95% sequence identity to that sequence (for example, page 9, lines 20-30). Further, the specification describes how to determine which sequences have at least 95% sequence identity to SEQ ID NO: 2 (for example, page 10, lines 3-15). Methods are also provided for determining which residues are highly conserved (for example, page 12, lines 4-6) and how to make polypeptide variants (for example, page 13, lines 3-9), for the generation of transgenic plants, and for determining if a plant (particularly a transgenic plant) is drought tolerant (*e.g.*, Example 1 on pages 17-18).

The Office is reminded that the description of a representative number of species does not require the description to be of such specificity that it would provide individual support for each species that the genus embraces. Guidelines for Examination of Patent Applications under the 35 U.S.C. § 112, ¶ 1, “Written Description” Requirement 66 Fed. Reg. 1099, 1106 (2001). Satisfactory disclosure of a “representative number” depends on whether one of skill in the art would recognize that Applicants were in possession of the necessary common attributes or features of the elements possessed by the members of the genus in view of the species disclosed. *Id.* Applicants submit that the knowledge and level of skill in the art would allow a person of ordinary skill to envision sequences having at least 95% sequence identity to the sequence set forth in SEQ ID NO: 2 based on the teachings of the specifications and the provision of SEQ ID NO: 2 itself. The pending claims are sufficiently described by the specification, and Applicants request that the rejection under 35 U.S.C. § 112, first paragraph, be withdrawn.

Rejections under 35 U.S.C. § 102(b)

Claims 1-11 have been rejected under 35 U.S.C. § 102(b), as allegedly (inherently) anticipated by Alexandrov *et al.* (EP 1033405, Published June 9, 2000 hereinafter Alexandrov *et al.*). Applicants respectfully traverse this rejection for at least the following reasons.

The Office action states that Alexandrov *et al.* disclose a method of producing a transgenic plant including a polynucleotide sequence encoding a polypeptide (SEQ ID NO: 33003) which is 100% identical to the instant SEQ ID NO: 2. The copy of Alexandrov *et al.* provided with the Office action does not include the sequences, and Applicants were not able to obtain the missing pages. The complete reference is not available from patent sources such as Delphion® or the European Patent Office. Further, the sequences alleged to be disclosed in Alexandrov *et al.* were not identified by Applicants in computerized searches of the PAT database available on the NCBI website, using BLAST software. Therefore, Applicants were not able to examine the sequence of SEQ ID NO: 33003 disclosed in Alexandrov *et al.*, or compare that sequence to SEQ ID NO: 2. Applicants respectfully request that the Office provide either the entire text of the Alexandrov *et al.* reference, or a sequence alignment of SEQ ID NO: 33003 and Applicants' SEQ ID NO: 2.

Claims 1-11 are not anticipated by Alexandrov *et al.* at least because Alexandrov *et al.* does not include an enabling disclosure. As stated in M.P.E.P. Section 2121.01, "[i]n determining that quantum of prior art disclosure which is necessary to declare an applicant's invention 'not novel' or 'anticipated' within section 102, the stated test is whether a reference contains an 'enabling disclosure'... ." *In re Hoeksema*, 399 F.2d 269, 158 USPQ 596 (CCPA 1968). Further, the disclosure "must provide an enabling disclosure of the desired subject matter; mere naming or description of the subject matter is insufficient, if it cannot be produced without undue experimentation." *Elan Pharm., Inc. v. Mayo Found. For Med. Educ. & Research*, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003). Here, Alexandrov *et al.* appear to disclose thousands of sequences, including SEQ ID NO: 33003. However, nowhere do Alexandrov *et al.* teach or suggest that SEQ ID NO: 33003 can be used to impart drought tolerance to a given plant. Thus, one of ordinary skill in the art would not know to select SEQ ID NO: 33003 over the other thousands of sequences disclosed to generate this feature without undue experimentation. Therefore, the Alexandrov *et al.* reference is not appropriate prior art, because it does not enable one skilled in the art to produce a transgenic plant with improved drought tolerance without under experimentation. The reference is no more enabling for Applicants' invention than is a native sequence in a cell – since in no way had Alexandrov *et al.* effectively isolated any one sequence from amongst the thousands.

The pending Office action (at page 5) also contends that the “property of drought tolerance of transgenic plants expressing said polynucleotide is inherent to the sequence taught in the reference.” Applicants respectfully disagree.

Anticipation requires “the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim.” *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984) (citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)) (emphasis added). Further, if anticipation is based upon the inherent teaching of a prior art reference, the Patent Office must provide a rationale or evidence tending to show inherency. “[T]o establish inherency the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be recognized by persons of ordinary skill.” (emphasis added) *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). Inherency may not be established by mere probability or possibilities; “the mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Id.*

Alexandrov *et al.* provide thousands of sequences. They do not demonstrate the capability of any of the disclosed sequences including SEQ ID NO: 33003 to impart drought tolerance to a plant. One of ordinary skill in the art would not therefore know to choose SEQ ID NO: 33003 over the other thousands of disclosed sequences to impart drought tolerance to a plant. Therefore, anticipation is not established because the missing descriptive matter (*i.e.*, the property of drought tolerance) is not necessarily present in the thing (*i.e.*, SEQ ID NO: 33003) described in the reference and further, it would not be recognized by persons of ordinary skill based on the teachings of the reference alone.

As Alexandrov *et al.* does not properly anticipate the current claims, Applicants respectfully request that the rejection under 35 U.S.C. §102(b) be withdrawn.

Conclusion

Applicants respectfully submit that the claims submitted herewith are in condition for allowance. If any issues impede the issuance of a notice of allowance, the Examiner is requested to contact the undersigned prior to the mailing of a next substantive Office action in order to arrange a telephone interview. It is believed that a brief discussion of the merits of the present application may expedite prosecution and allowance of the claims.

Respectfully submitted,

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